REMARKS

The present response is intended to be fully responsive to all points of rejection raised by the Examiner and is believed to place the application in condition for allowance. Favorable reconsideration and allowance of the application is respectfully requested.

Claims 1-64 are pending in this case. Claims 1-39, 41-43, 45-46, 48-49 have been rejected under 35 U.S.C. § 102(e). Claims 40, 44, 47, 50-51 have been rejected under 35 U.S.C. § 103(a). Claims 52-62 are allowed.

Response to 35 U.S.C. § 102(e) Rejections

The Examiner rejected claims 1-39, 41-43, 45-46, 48-49 under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,711,297 ("Chang et al.").

Regarding independent claims 1, 7, 13 and 25:

Applicant respectfully submits that the prior art fails to disclose or suggest at least a lossless progressive image streaming system wherein the client computer generates and transmits to the server a request list containing the coordinates of data blocks required for rendering a region of interest (ROI) within the digital image, wherein the request list is ordered in accordance with a **selected progressive mode**. Therefore, Applicant respectfully traverses the rejections and request favorable reconsideration.

Further, Applicant has reviewed the cited art and respectfully submits that the art fails to disclose or suggest Applicant's claimed invention, and fails to teach each and every element and limitation of the claims rejected herein. Therefore Applicant respectfully traverses the rejections and requests favorable reconsideration.

Chang et al. teaches a dynamic transfer scheme for transferring data including images from a server to a client. Source data is transformed into a hierarchical representation comprising a plurality of levels of transform data, such that a level of the hierarchical representation comprises transfer data sufficient to reconstruct the source data at a resolution corresponding to the level. The server transfers transform data from a level of the hierarchical representation corresponding to the desired resolution.

It is submitted that the image transfer scheme of Chang et al. transfers data from the server to the client only in accordance with the desired resolution. The client requests physical coefficient coordinates from the server according to the desired resolution level chosen by the user.

In contrast, the lossless progressive image streaming mechanism of the present invention is operative to generate a request list at the client whereby the coordinates of the data blocks included in the request list are ordered in accordance with a **selected progressive mode**. The progressive mode may be one of three difference modes: (1) progressive by quality, (2) progressive by resolution or (3) progressive by spatial order. In each mode, the request list contents are ordered in a different way. Each progressive mode has advantages depending on the particular application. For example, progressive by quality is optimal when viewing in low bandwidth environments because in this mode, the subband coefficients with the largest absolute values are requested first, followed by subband coefficients with coefficients having smaller absolute values. The coefficients with larger absolute value are requested first since they represent the most visually significant data such as strong edges in the image (see paragraph [0270]). Progressive by spatial order is optimal with, for example, a "print on demand" feature where the region of interest (ROI) is actually a low resolution "proof print" of a high resolution graphic art image. In this mode, the data blocks are ordered in top to bottom order, so that the image can be printed in parallel to its transmission (see paragraph [0255]). These features are neither taught nor suggested by Chang et al.

The Examiner asserts that Change does anticipate the claim limitation of "wherein said request list is ordered in accordance with a selected progressive mode". Chang explains that the request includes physical coefficient coordinates, which is the claimed "request list", and such a request list is in accordance with "the pyramidal data structure", which is the claimed "a selected progressive mode". The pyramidal data structure being a coarse to fine mode.

Applicants respectfully submit that Chang cannot anticipate this claim limitation since Chang only teaches a single mode of requesting data from the server, i.e. by resolution. As taught by Chang, all data requests from the client to the server are according to resolution. All requests include "pixel coordinates, with reference to the original source image, to define the image area and the resolution of the source image" (see col. 9, lines 42-47). Chang does **not** teach whatsoever the progressive by quality (i.e. accuracy) or spatial order modes as taught by the present invention. Chang, therefore, **cannot** teach the client sending a request list that is ordered in accordance with a progressive mode since Chang only teaches a **single** mode, that mode being progressive by resolution. Users of the apparatus of Chang do **not** have a choice of progressive mode and thus **cannot** select a progressive mode. Users of the present invention, however, can select from among **three** different progressive modes in generating the request list at the client. These are: (1) progressive by quality (referred to also as progressive by accuracy), (2) progressive by resolution, and (3) progressive by spatial order. Chang only teaches progressive by resolution.

Further, the Examiner cites *In re Casey*, 152 USPQ 235 (CCPA 1967) and *In re Otto*, 136 USPQ 458, 459 (CCPA 1963) for the principle that a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In a claim drawn to a process of making, the intended use must result in a manipulative difference as compared to the prior art.

Applicants respectfully submit that the prior art structure of Chang is **not** capable of performing the intended use. Here, the structural difference is the capability of ordering the request list in accordance with one of three difference progressive modes. The intended use in this case is a client operative to form a request list whose contents are ordered in accordance with a selected progressive mode. It is submitted that the structure of Chang **cannot** perform this intended use. This is because Chang only teaches progressive by resolution whereby coefficients are requested by resolution **only**. Thus, Chang is **not** capable of performing the intended art and does **not** meet the claim.

In direct contrast, the present invention is operative request coefficients in accordance with one of three difference progressive modes: (1) progressive by quality, (2) progressive by resolution, and (3) progressive by spatial order. The progressive mode selected determines how the request list is ordered. This is the intended use of the claim and the apparatus of Chang does not meet it.

Regarding claim 7 and the limitation of a server computer operative to process the digital image through a low pass filter and a lossless wavelet transform to yield low pass scaling function data, high pass wavelet coefficient data and halfbit data, it is submitted that the apparatus of Chang does **not** teach or suggest halfbit data whatsoever. The present invention generates halfbit data in order to improve the approximation of the mathematical transform. The extra matrix, called a halfbit matrix, enables the reversibility of the high Y-transform step. The elements in this matrix are bits, such that each bit corresponds to an HH-subband coefficient. The halfbit data is calculated and stored and later used in computing the HH-subband coefficients. For every HH-subband coefficient (in all scales) there is a corresponding bit - which is the coefficient's halfbit. See paragraphs [0114] through [0125]. This feature is neither taught nor suggested by Chang. It is therefore submitted that Chang does not anticipate the present invention.

Regarding independent claims 19, 31 and 41:

Applicant respectfully submits that the prior art fails to disclose or suggest at least a lossless progressive image streaming system wherein the client computer generates and transmits across the

communication network a request list containing the coordinates of data blocks required for rendering a region of interest (ROI) within the digital image, wherein the request list is **ordered in accordance with the absolute value of requested subband coefficients** whereby subband coefficients with larger absolute values are requested before subband coefficients with smaller absolute values. This is the progressive by quality mode of image streaming as taught by the present invention.

It is submitted that the wavelet transform of Chang et al. teaches progressive by resolution mode since it requests subband data from the server according to resolution.

In contrast, the lossless progressive image streaming mechanism of the present invention discloses an image streaming mechanism whereby the client is adapted to request data blocks of subband coefficient data form the server in accordance with one of several possible progressive modes. One of these modes is progressive by quality whereby the client generates a request list of coordinates corresponding to the data blocks, wherein the request list is ordered in accordance with the absolute value of requested subband coefficients whereby subband coefficients with larger absolute values are requested **before** subband coefficients with smaller absolute values. This feature is neither taught nor suggested by Chang et al.

The Examiner asserts that the coarse to fine mode of Chang inherently includes the characteristic of "subband coefficients with larger absolute values are requested before subband coefficients with smaller absolute values" because the coarse level coefficients are low frequency coefficients, which have the large absolute value, and the fine coefficients are high frequency coefficients, which have small absolute value, see col. 8, lines 6-22.

Applicant respectfully submits that this is **not** an accurate statement as it is **not** always the case that the low frequency coefficients have large absolute value and the high frequency coefficients have small absolute value. It is well known in the image processing arts that, in general, coefficients with the largest absolute value can come from **any** resolution or subband. Similarly, coefficients with the smallest absolute value can likewise come from **any** resolution or subband. For example, high resolution coefficients in the vicinity of edges (e.g., consider a checkerboard image pattern) have larger absolute value than low resolution coefficients that are supported in a smooth region of the image (i.e. not in the vicinity of edges). In fact, depending on the contents of the particular image, many of the low resolution coefficients may have zero value. Further, many of the high frequency coefficients may, in fact, have very large absolute values.

The scheme of the present invention to transmit the larger absolute coefficients first results in the mathematical error of progressive by quality being much smaller. A smaller mathematical error

results in a visual quality that is significantly higher than that achievable by progressive by resolution. This is a main advantage of the present invention over the prior art, and especially the Chang reference. Thus, the **progressive by quality** mode of the present invention is significantly difference and should be distinguished from the progressive by resolution mode as taught by the present invention and Chang.

As stated hereinabove, the progressive by quality mode of the present invention is useful when viewing images in low bandwidth environments because in this mode, the subband coefficients with the largest absolute values are requested first, followed by subband coefficients with coefficients having smaller absolute values. The coefficients with larger absolute value are requested first since they represent the most visually significant data such as strong edges in the image

In light of the arguments presented hereinabove, it is believed that independent claims 1, 7, 13, 19, 25, 31, 41 and 52 overcome the Examiner's § 102(e) rejection based on the Chang et al. reference. In addition, it is believed that dependent claims 2-6, 8-12, 14-18, 20-24, 26-30, 32-39, 42-43, 45-46, 48-49 also overcome the Examiner's rejection based on § 102(e) grounds. The Examiner is respectfully requested to withdraw the rejection based on § 102(e).

Response to 35 U.S.C. § 103(a) Rejections

Regarding claims 40, 44, 47 and 50:

The Examiner rejected claims 40, 44, 47, 50 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,711,297 ("Chang et al.") in view of U.S. Patent No. 5,666,161 ("Kohiyama et al.").

Kohiyama et al. teaches compressed image data of a desired picture is read out from a memory having compressed image data of a sequential format stored therein and then subjected to an examination with respect to a plurality of frequency components of the read-out compressed image data. Part of the plurality of frequency components is deleted to obtain compressed image data of a quality lower than an original quality of the compressed image data. The obtained compressed image data of the lower quality is decoded and displayed on a display. The plurality of frequency components are deleted in a stepwise manner according to a traffic state of a transmission line through which the compressed image data is to be transmitted. For maintaining a picture frame rate to be constant, the plurality of frequency components may be deleted in a stepwise manner. For

obtaining a desired decoding rate, the plurality of frequency components may be deleted in a stepwise manner.

The combination of Chang and Kohiyama would not result in the claimed invention. The Examiner has improperly combined Chang and Kohiyama in an attempt to arrive at the claimed invention. The combination suggested by the Examiner fails to teach or suggest all the claims limitations. Because Chang and Kohiyama do not anticipate or suggest claims 1, 7, 13, 25 as discussed above, then claims 40, 44, 47, 50 are allowable as well. The Applicant respectfully traverses the objections of claims 40, 44, 47, 50 and submits that the presently claimed invention is patently distinct over Chang in view of Kohiyama.

Regarding independent claim 51:

The Examiner rejected claim 51 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,711,297 ("Chang et al.").

Regarding claim 51 and the limitation of a server computer operative to process the digital image through a low pass filter and a lossless wavelet transform to yield low pass scaling function data, high pass wavelet coefficient data and halfbit data, it is submitted that the Chang reference does **not** teach or suggest generating, storing and using halfbit data whatsoever. The present invention generates halfbit data in order to improve the approximation of the mathematical transform. The extra matrix, called a halfbit matrix, enables the reversibility of the high Y-transform step. The elements in this matrix are bits, such that each bit corresponds to an HH-subband coefficient. The halfbit data is calculated and stored and later used in computing the HH-subband coefficients. For every HH-subband coefficient (in all scales) there is a corresponding bit - which is the coefficient's halfbit. See paragraphs [0114] through [0125]. This feature is neither taught nor suggested by the Chang reference.

It is believed that independent claim 51 overcomes the Examiner's § 103(a) rejection based on the Chang reference. The Examiner is respectfully requested to withdraw the rejection based on § 103(a).

Conclusion

In view of the above amendments and remarks, it is respectfully submitted that independent claims 1, 7, 13, 19, 25, 31, 41, 51, 52 and hence dependent claims 2-6, 8-12, 14-18, 20-24, 26-30, 32-40, 42-50, 53-64 are now in condition for allowance. Prompt notice of allowance is respectfully solicited.

In light of the Amendments and the arguments set forth above, Applicant earnestly believes that they are entitled to a letters patent, and respectively solicit the Examiner to expedite prosecution of this patent applications to issuance. Should the Examiner have any questions, the Examiner is encouraged to telephone the undersigned.

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Respectfully submitted,

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